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*Review Article*

# Unlocking the Power of Mahua: A Comprehensive Guide

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## Abstract

Mahua (*Madhuca longifolia*), a member of the sapotaceae family, is valued by tribal people for its delicious blooms, which also have a great deal of cultural significance in the production of several fermented and non-fermented food items. The Mahua tree is a big to medium-sized deciduous tree that typically has a broad, rounded crown and a short bole. The *Madhuca longifolia* tree is also regarded as a medicinal plant with antibacterial, anticancer, hepatoprotective, antiulcer, antihyperglycemic, and analgesic properties. It can be applied topically to treat skin conditions, rheumatism, headaches, chronic constipation, piles, and hemorrhoids. Mahua is a useful plant that grows in the subtropical areas of Sri Lanka, Australia, and India. The tribal people who live in the forest highly value and view it as a blessing. The Mahua tree and the Mahua drink are considered as a part of their cultural legacy. This paper aims to focus on the medicinal uses of mahua flower.

**Keywords:** Delicious, Bole, Hepatoprotective, Hemorrhoids, Deciduous.

## INTRODUCTION

Mahua is one of the multifunctional forest tree species, belonging to the Sapotaceae family, that may be used for food, fodder, and fuel. It is extensively available in South Asian nations. Mahua flowers are widely recognized for having a lot of nutrients and reducing sugar. They are edible and used to sweeten a variety of regional foods such as halwa, kheer, puri, and burfi in India's belt of mahua cultivation. Before being processed completely, mahua flowers go through a number of unit operations, so understanding their physical characteristics is necessary for designing value-added products, fabricating specialized equipment and structures for handling, transport, processing, and storage, as well as determining how the product will behave. Mahua flowers' physical characteristics are crucial for the development of machinery for drying, cleaning, grading, storage, and value-added goods.

Mahua, also known as the Indian Butter Tree, is a significant tree that thrives across the tropical and subtropical regions of the Indian subcontinent and has significant economic

importance. It is a deciduous tree that thrives in a variety of habitats in dry tropical and subtropical climates Dogra (2022). It is quite tough and does well in rocky, gravelly, salty, and sodic soils, even in soil pockets between bare rock cracks Ekka & Ekka (2014). While the dry husk is a suitable source for alcoholic fermentation, the fruit pulp can be used as a source of sugar. Seeds are an excellent source of oil. Mahua, the name of the tree, yields tasty fruits and blossoms. An alkaloid glucoside called saponin is found in the leaves of the Mahua tree.

The seeds have been discovered to contain sapogenin and other basic acids. The corolla, also known as mahua blossoms, is a notable source of vitamins and minerals and a rich source of sugar. The Mahua tree blooms from March to April, when agricultural production is at its lowest. It serves as a source of revenue and job creation for the most vulnerable members of society.

Vitamins A and C are the two main vitamins found in flowers. Bark contains a lot of phytoconstituents, which may be the cause of a variety of activities. It is made up

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of sesquiterpene alcohol, erythrodiol monocaprylate betulinic acid, erythrodiol monospinasterol, and oleanic acids. Chemically, the fruits of *Madhuca* contain amyirin acetates, dihydroquercetin, -sitosterol, and quercetin. The main amino acids found in *M. longifolia* seeds are glycine, alanine, cysteine, leucine, and isoleucine Mishra & Poonia (2019). Arachidic, oleic, linoleic, myristic, palmitic, and stearic acids are also present. Also present in seeds are quercetin and the misaponins A and B. Sitosterol, quercetin, 3-O-Lrhamnoside, stigmasterol, n-hexacosanol, carotene, myricitin, erythrodiol, -D-glucoside,  $\beta$ -sitosterol, 3-O-arabinoside, and xanthophylls are just a few of the bioactive components that have been isolated and identified in *Madhuca* leaves.

Before storage, mahua flowers are sun-dried in the open. Due to their hygroscopic nature, flowers rapidly deteriorate by collecting ambient moisture. The tribe members must sell their items right away, either with little or no value addition. Only a negligible number of mahua flowers are eaten raw, roasted, or fried in different parts of the nation Pinakin (2018). The most notable type of waste, spotting or rotting, accounts for 20–25 percent of post-harvest losses in mahua flowers, making them only viable for use in distilleries and as cattle fodder Ramadan et al., (2015). Thus, although being a rich source of nutrients, the actual value of this natural product is still being wasted.

### Taxonomy of Mahua

**Botanical Name:** *Madhuca longifolia*

**Family:** Sapotaceae

**Subfamily:** Caesalpinioideae

**Tribes:** Caesalpinieae

**Genus:** *Madhuca*

**Species:** *longifolia*

**Order:** Ericaleae

### Composition of Flower

Mahua flowers may be used to produce traditional or contemporary alcoholic beverages since they are a rich source of sugar, which gives them their sweet flavor. Mahua flowers have a large level of vitamin C, which is what gives them their antioxidant properties Sinha et al., (2017). The

carotene found in mahua flowers serves as a precursor to vitamin A. Minerals like calcium and phosphorus are also present in flowers in good quantities. Mahua flowers also contain small quantities of lipids and proteins. Many studies have been conducted to determine the therapeutic benefits of mahua flowers, including their anthelmintic, antibacterial, analgesic, hepatoprotective, antioxidant, and anticancer characteristics (Table 1).

## MAIN BODY

**Flower:** Mahua flowers are renowned for being extremely helpful in the treatment and prevention of numerous ailments. The blooms of Mahua are said to have cooling, aphrodisiac, galactagogues, and carminative properties in the Ayurvedic medical system of India. Additionally, they are said to be helpful for ear problems, burning sensations, and cardiac conditions. People with piles consume the blossoms that have been cooked in clarified butter Yadav (2022). For oleation in skin conditions, floral juice is massaged. In disorders of the head caused by pitta, such as sinusitis, it is also helpful as nasal drops. The flower decoction is an effective treatment for pitta disorders. The flower powder blends well with ghee and honey as a general tonic. Mahua is used for colitis and diarrhea because of its astringent properties. Fresh flower juice is used to great effect in raktapitta to stop bleeding Yadav (2012). The blooms are crucial in increasing the amount of seminal fluids and breast milk produced by breastfeeding moms.

**Fruit:** According to reports, the fruits of *Madhuca longifolia* contain a variety of triterpenoids, including acetates of amyriins  $\alpha$  and  $\beta$ , erythrodiol's  $3\beta$  -monocaprylic ester,  $3\beta$  -capryloxyoleanolic acid, and an acetate. N-hexacosanol, the  $\beta$ -glucoside of  $\beta$ -sitosterol, and free -sitosterol are the other ingredients that were identified and characterized. The nutshell includes quercetin, hydroquercetin, and  $\beta$ -glucoside of  $\beta$ -sitosterol.

**Hepatoprotective activity:** The *Madhuca longifolia* flower's methanolic extract has hepatoprotective efficacy against paracetamol-induced liver damage. The methanolic extract demonstrated a significant protective effect by reducing serum levels of a number of biochemical markers, including total bilirubin, alkaline phosphatase, glutamic oxaloacetic transaminase, and glutamic pyruvic transaminase, and raising serum levels of total protein and albumin in the chosen model.

**Table 1:** Composition of flower.

Sr.no	Constituents	mahua flower
1	Moisture	11.61-19.8
2	pH	4.6
3	Fat (%)	0.06-0.09
4	Protein (%)	5.62
5	Total sugars (g/100g)	41.62

**Mahua for epilepsy:** A person with epilepsy gets fits as a result of aberrant brain activity. Mahua is a fantastic remedy for this ailment. Despite the numerous medications available for the management of epilepsy, tribal people continue to rely on natural methods. According to research, methanolic extracts of mahua leaves boost the production of GABA, a neurotransmitter that helps epilepsy sufferers deal with their disturbed neuronal activity. This shortens the length of seizures as well as delaying their start.

**Mahua for liver:** The liver is one of the body's most vital organs. It supports general health by aiding in bodily detoxification as well as digestion. Mahua is an elixir for the liver as its name suggests. As a hepatoprotective drug, it strengthens the liver's cell walls to stop the release of toxic substances into the blood, such as Serum Glutamic-Oxaloacetic Transaminase (SGOT) and Alanine Aminotransferase (ALT). These two substances are utilized as indicators of liver injury, therefore their absence from the circulation suggests a healthy liver. Mahua's antioxidant properties have also been hypothesized to aid in preventing liver cell death in hepatitis, an inflammation of the liver. Symptoms of hepatitis will be relieved, and the disease's course will be slowed.

**Mahua for diabetes:** A collection of metabolic disorders known as diabetes indicate the presence of hyperglycemia (increased glucose). The functioning of the body's major organs is impacted if neglected. Despite the availability of a broad variety of medications to treat diabetic symptoms, modern medicine is still unable to fully avoid the problems associated with this condition. Significant antidiabetic action in animal models has been suggested by experimental research employing extracts of the bark of the mahua tree. Although the precise process is unknown, it is clear that these extracts work in a dose-dependent manner to lower the body's circulating levels of glucose. Another piece of research points to the effectiveness of mahua extracts in lowering cholesterol levels, which otherwise result in low insulin and high blood sugar. Finally, mahua has been shown to enhance renal function in diabetic animal models, suggesting that it may be used to stop diabetes-related nephropathy.

**Mahua for fever:** Although it also causes one to feel weak and fatigued, fever is frequently thought of as the body's defense against illness. Mahua bark crude methanolic extracts exhibit notable antipyretic, analgesic, and anti-inflammatory properties, which eventually worsen the symptoms of fever, inflammation, and pain, according to research investigations. Mahua seeds are another option that you may use to encourage a speedy recovery from a fever because they are so rich in nutritious elements.

**Mahua for intestinal worms:** One of the most typical helminth infections in the globe is worm infection. Although they mostly afflict the underprivileged and impoverished

areas, there are ongoing cases in industrialized nations as well. Typically, they raise the chance of anemia and gastrointestinal problems. As a result, it's critical to start treatment as soon as possible. The all-in-one tree known as mahua is a fantastic treatment for various parasite illnesses. Despite the presence of other plant extracts, *Madhuca longifolia* has been shown to have powerful anti-helminthic efficacy in both methanolic and ethanolic extracts. According to laboratory investigations, mahua methanolic extracts yield toxicity when given to worms at a concentration of 60 mg/ml, paralyzing or killing them. Though nothing can be stated regarding its impact on the human body given the lack of clinical trials.

**Mahua for dental problems:** Mahua is said to be very helpful for preventing gum disease and curing tonsillitis. In the past, people used a liquid extract made from the mahua tree's bark combined with 300 mL of water as a gargle to treat bleeding and spongy gums. The symptoms of inflammatory disorders like acute tonsillitis and pharyngitis are also treated with the same medication. According to laboratory investigations, this is because the bark of the *Madhuca longifolia* plant has antibacterial capabilities, which it partly owes to the presence of active substances called triterpenoid saponins.

**Mahua for skin:** Mahua flower juice has historically been used to treat a variety of skin issues. The oleating qualities of this juice make it very useful against itching. Mahua leaves can help relieve symptoms of eczema when they are wrapped over the afflicted area and cooked over a fire with sesame oil. Because mahua contains saponins and flavonoids, animal tests show that it has strong anti-inflammatory properties. These substances are crucial for the healing and repair of wounds. *Madhuca longifolia* has also shown analgesic effect in experimental tests using alcoholic extracts, which can be utilized to relieve pain from burns and wounds.

**Mahua for stomach ulcers:** An open sore that develops in the inner lining of the stomach or intestines is referred to as a stomach ulcer or gastric ulcer. They are brought on by an overproduction of gastric fluids, which disturbs the mucous membrane of the stomach. This mucus coating is supposed to shield the stomach from the digestive fluids that are present there. Mahua is said to be particularly efficient in reducing the agonizing sensations of peptic ulcers due to its strong anti-ulcer characteristics. It lessens the discomfort produced by stomach acid by inhibiting the secretion of histamine, a substance that regulates acid production in the stomach, enabling the ulcer to heal. Mahua also has a demulcent activity, which means it creates a barrier across the stomach's mucous membrane to shield it from the damaging effects of too much acid.

**Mahua for bronchitis:** People with chronic bronchitis are traditionally given a glass of milk and distilled mahua flower juice to relieve their symptoms. An inflammation of the

**Table 2:** Medicinal properties of mahua flower.

Medicinal properties	Type of extract	Remarks	References
Anthelmintic activity	Both methanolic and ethanolic	Among both extracts methanolic extract of flower demonstrated best anthelmintic activity against Indian earthworm.	Katiyar et al., (2011) Yadav et al., (2012) (a); Sinha et al., (2017)
Hepatoprotective activity	Methanolic	Methanolic extract of flower showed potential protective effect by lowering the levels of SGOT, SGPT, ALP and total bilirubin by increasing serum level of total proteins and albumins.	Umadevi et al., (2011); Patel et al., (2012); Yadav et al., (2012) (a); Mishra and Pradhan, (2013), Sinha et al., (2017)
Antibacterial activity	Both aqueous and methanolic	Aqueous extract showed more antibacterial activity than methanolic one for <i>Bacillus subtilis</i> and <i>Klebsiella pneumonia</i>	Verma et al., (2010); Patel et al., (2012); Yadav et al., (2012); Sinha et al., (2017)
Anticancer activity	.....	Cell viability was found to decrease as the concentration of floral extract increases and cytotoxic effect was found to increase.	Indu and Annika, (2014)
Analgesic activity	Both aqueous and alcoholic	Analgesic effect was studied through tail flick, hot plate and chemical graded doses on mice which shows analgesic effect as per dose value.	Chandra, (2001); Neha and Rekha, (2010); Saluja et al., (2011); Patel et al., (2012); Yadav et al., (2012) (a); Amia and Ekka, (2014); Verma et al., (2014); Sinha et al., (2017)
Antioxidant activity	.....	As concentration of flower extract and ascorbic acid increases, the ferric reducing antioxidant power increases.	Indu and Annika, (2014)

airways, particularly the bronchial tubes, which are in charge of delivering air to your lungs, is known as bronchitis. Due to increased mucus production, it appears as coughing, which is followed by wheezing and shortness of breath. The expectorant properties of *Madhuca longifolia* flowers help to thin mucus discharges. They also aid in boosting mucus secretion, making it simpler for the body to expel the mucus. Additionally, being an anti-inflammatory and antioxidant herb, it helps lessen the intensity of the inflammation, facilitating a speedy recovery.

**Mahua for heart disease:** Cardiovascular diseases, more commonly known as heart diseases, claim a large number of deaths in the world every year. Mahua seeds, with their multiple pharmacological actions, not only help promote heart health but also are favorable for maintaining the overall health of the body. Clinical studies have shown that the predominant presence of monounsaturated fatty acids, particularly oleic acid in mahua seeds help to reduce low-density lipoprotein (LDL or bad cholesterol), which otherwise poses a high risk for Coronary Heart Disease (CHD). In fact, mahua oil is considered as one of the best cooking oils, even better than palm oil or kokum butter (Table 2).

## CONCLUSION

As a result of its several uses and widespread availability in that region, it is able to provide the fundamental needs of tribal people in the form of 3F, or feed, fodder, and fuel. However, because of its restricted availability at limited locations for a short period of time, it is still untapped by processors, researchers, and customers outside of those

locations and certain times. According to the most recent research, tribal people's misdeeds in flower preservation are causing the qualitative qualities of the bloom to decrease. In order to address these problems, there is an urgent need for the commercial use of this flower as well as cutting-edge technologies for the creation of numerous valuable food products and their availability all year round. This will undoubtedly aid in the improvement of the economy of tribal people and their sustainable development. The improvement of the flower's qualitative characteristics, which may assist to increase employment and revenue in those cultures, will undoubtedly be aided by the development of effective technologies and knowledge among the tribal people. Mahua (*Madhuca longifolia*) is a very nutritious tree with several ethnomedical qualities, including antibacterial, anticancer, hepatoprotective, antihyperglycemic, and analgesic actions, according to a study of the literature. There has been a significant amount of study on the mahua flower, fruit, and seed to emphasize its therapeutic characteristics, but there has been far less experimental work done on using it as a food or food additive. A review reveals that, in contrast to the fabrication of food or medicine, only the mahua flower is commercially employed extensively in the manufacture of alcohol. However, this very beneficial and helpful tree is thought to be underutilized due to a lack of relevant information and processing techniques. Mahua blossoms are currently being diverted for commercial usage in a variety of fruit and culinary products, and the seed will also be used to make pharmaceuticals. The nation's capacity to generate money and jobs may rise as a result of this endeavor.

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